The Esophagus in Radiologic Problems

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• *Examination of the esophagus must go considerably beyond observation of "a barium swallow"; it must include a thorough study of the hypopharynx, the cervical esophagus and the thoracic esophagus. Dysphagia, which is almost always the presenting complaint, may be due to a number of lesions originating outside the esophagus and thus cause no sign of mucous membrane destruction or of filling defect.*

DYSPHAGIA is the one predominant symptom which ordinarily first suggests the possibility of cancer of the esophagus. It is the initial symptom in most cases. Difficulty in swallowing may also be caused by lesions of the neck, mediastinum and the brain stem. This presentation deals with radiologic aspects of some of these not infrequently overlooked lesions.

Barium examination should be preceded by a careful fluoroscopic examination of the neck and chest with films as indicated. The act of deglutition, as well as the morphologic features of the soft tissues, should be observed. The vocal cords and laryngeal ventricles should be observed both while at rest and during phonation.

The first swallow of barium should be watched as it passes through the esophagus into the stomach to rule out gross obstruction. In a study of the esophagus, attention should be given to the base of the tongue, hypopharynx and extrinsic laryngeal structures. Observations must be directed to physiologic disturbances as well as to the form and shape of these structures. The action of the epiglottis can be observed as the tip turns over to form a lid to protect the larynx, at the same time that it directs the bolus of barium into the lateral channels and pyriform recesses. The surface of the base of the tongue, the valleculae, epiglottis, pyriform recesses and postpharyngeal wall can be visualized by coating them with contrast substances. Observations and film exposures should be made with complete filling and with mucosal relief of the hypopharynx and upper esophagus as well as the thoracic esophagus. The most difficult area to observe and record is at the junction of the hypopharynx and cervical esophagus. Small tumors of the postcricoid area are best demonstrated by the mucosal relief study. Tumors of the arytenoid region are best detected by the asymmetrical filling or defect of the opaque column due to the mass encroaching on the aryepiglottic folds or pyriform recess.

The *vallecular sign* in dysphagia is the abnormal retention or failure of symmetrical filling of the valleculae and pyriform recesses. In lesions of the central nervous system the pyriform recesses tend to balloon out as a result of interference with the constrictor muscles of the pharynx as in bulbar or pseudobulbar palsy. There is also limitation or absence of upward movement of the larynx during the act of swallowing. Regurgitation of fluid through the nose or spilling it over into the larynx are the result of paralysis of the soft palate or epiglottis. The vallecular sign may also be the first clue to attract attention to some other abnormality such as cancer of the base of the tongue, hypopharynx, extrinsic larynx, mediastinal tumor, an anomaly of the aorta or great vessels or cancer of the esophagogastric area.

Dysphagia associated with fatigue on repeated attempts at swallowing will afford a clue to the diagnosis of myasthenia gravis.

Dysphagia without hoarseness may result from an injury or stretch of a recurrent laryngeal nerve, as after a thyroidectomy, or in the presence of an aneurysm or mediastinal neoplasm. Many patients have more difficulty with liquids than with solids. Hence the need to examine with very thin as well as thick barium mixtures.

In hysterical or functional dysphagia (Plummer-Vinson syndrome) there are mucous membrane changes in the mouth, hypochromic anemia and an inability to swallow solid food. There is disagreement as to whether the changes in the mucous membrane of the mouth and esophagus and the anemia are responsible for the difficulty in swallowing, or whether as a result of the dysphagia there is inadequate food intake which results in the anemia and avitaminosis. There is also disagreement as to the presence of a partial web or partition at the level of the cricoid, but the author has demonstrated it occasionally and believes it to be the cause of the dysphagia. In this condition the findings are those of a disturbance of deglutition and not of stenosis

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with prestenotic regurgitation. This slight change may also be a very early manifestation of neoplastic disease. It is well to remember that this area at the entrance to the esophagus is also difficult for an endoscopist to observe. The passing of an esophagoscope may greatly relieve the symptoms and even if no positive findings are noted it is well to recommend follow-up examinations.

Deviations from the normal alignment of the opaque column in the esophagus should be searched for. Thyroid, parathyroid, and lymph node masses in the neck may, if small, cause only slight deviations and search for them should be made with the patient in the true posteroanterior and lateral projections. Intrathoracic thyroid masses, mediastinal tumors and anomalies of the aorta and great vessels also cause deviation or displacement of the barium-filled esophagus, and true posteroanterior and lateral projection is necessary for evaluation of them.

Dysphagia and unproductive cough together should suggest mediastinal invasion by a neoplastic process even though the lungs appear clear and the mucous membrane of the esophagus appears normal. The symptoms are produced by the fixation of the trachea, major bronchi and esophagus by the mediastinal lymph nodes. With the patient in the Trendelenburg position and drinking barium rapidly, one can observe the rigid, tube-like appearance of the esophagus with loss of normal distensibility.

Vague difficulty in swallowing with equally vague substernal distress should lead to search for evidence of vascular rings or for anomalous origin of one of the great vessels. These conditions, which come readily to mind when examining children, since surgical correction is so gratifying, should be given consideration in adult patients also. Mild variations of these anomalies in adults may not be detected unless searched for specifically. Surgical correction may not be indicated, but it is gratifying to be able to explain the symptoms on an organic rather than a functional basis.

ILLUSTRATIVE CASE REPORTS

The following brief reports of cases will help to illustrate some of these abnormal findings.

CASE 1: A 58-year-old man had difficulty in swallowing for four months. The act of swallowing could not be carried out normally and the larynx did not become elevated to the usual extent during the act of deglutition. The chest appeared normal. Barium studies (Figure 1) showed retention of the barium in the valleculae and abnormal distention of the pyriform recesses and hypopharynx. There was no spillover of the barium into the larynx. The cervical and thoracic portions of the esophagus appeared normal. Diagnosis: Paralysis of the constrictor muscles of the pharynx due to a lesion of the brain stem.

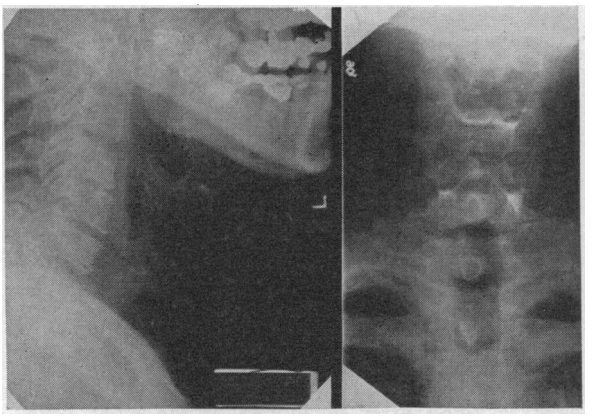

Figure 1 (Case 1)—Retention of barium in valleculae, abnormal distention of pyriform recesses, and hypopharynx.

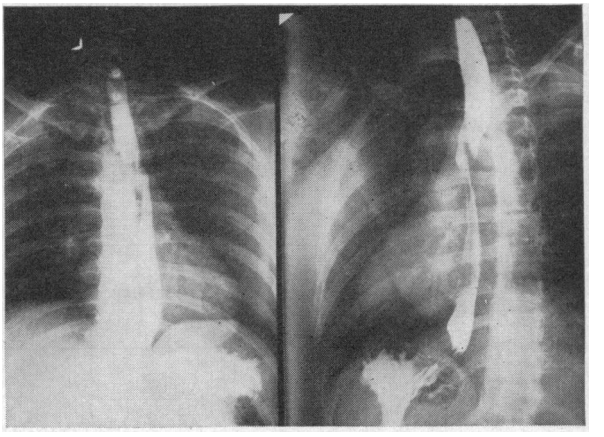

Figure 2 (Case 2)—Right-sided aorta with thoracic aorta ascending on right.

CASE 2: The patient was a 40-year-old woman who, in addition to symptoms suggesting a peptic ulcer, had vague complaints of difficulty "all my life" in swallowing and substernal distress while eating. Several previous examinations had been reported as showing no abnormality or as showing right-sided aorta. A study of the esophagus at the start of the gastrointestinal examination revealed a right-sided aorta with the thoracic aorta descending on the right (Figure 2). A deformity of the esophagus was produced by the left subclavian artery's originating from the arch or upper thoracic aorta and then crossing behind the esophagus to the left side of the neck. Diagnosis: Right aortic arch and descending thoracic aorta with deformity of the esophagus by abnormal course of the left subclavian artery.

CASE 3: A 71-year-old man complained of difficulty in swallowing of a few weeks' duration, with occasional "choking spells" while eating. An earlier diagnosis was made of a carcinoma of the esophagus with mediastinal invasion and esophageal tracheal fistula because barium appeared at the bifurcation of the trachea. The fluoroscopic examination and film

study began in the cervical esophagus. Upon further examination the following day, a study of the hypopharynx showed a mass involving the extrinsic larynx, obliteration of the right pyriform recess and subglottic extension with spill-over into the larynx, the barium then passing to the level of the root of the lungs. The cervical and thoracic portions of the esophagus were normal. The diagnosis was carcinoma of the right arytenoid and extrinsic larynx. Biopsy of the lesion showed it to be Grade II squamous cell carcinoma.

CASE 4: A 68-year-old man gave a history of prostatic carcinoma in 1943, and right renal carcinoma in 1949, both treated surgically. In January, 1951, a small mass developed at the right hilum. Upon examination of tissue removed through a bronchoscope, oat cell carcinoma was diagnosed. Roentgen therapy was given and the mass disappeared. In January, 1952, dysphagia developed. No evidence of the previous mass was seen in examinations of the chest. In a study of the esophagus, fixation and invasion from the mediastinum were noted. Tissue removed from the esophagus was histologically the same as that removed from the bronchus earlier. X-ray therapy was given and the symptoms subsided. The patient received 2,000 roentgens to each of two ports and 1,080 roentgens to each of two ports, measured in air, using a Thoreus filter at 55 cm. target skin distance. A barium study seven weeks later showed no evidence of invasion of the esophagus but there was mediastinal fixation. The lumen of the esophagus appeared normal. At autopsy seven months later, generalized carcinomatosis from both the prostatic and the pulmonary carcinoma was noted. The mediastinum showed extensive invasion with involvement of the wall of the esophagus but no diminution of the lumen of the esophagus.

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